PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	Wilhelmus H.A. Bruls, et al.
For	:	VIDEO ENCODING AND DECODING
Serial No.:	:	09/773,156
Filed	:	January 31, 2001
Art Unit	:	2621
Examiner	:	Allen C. Wong
Att. Docket	:	PHNL 000031
Confirmation No.	:	8179

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
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Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed on November 20, 2006.

I. REAL PARTY IN INTEREST

The party in interest is U.S. Philips Corporation, by way of an Assignment recorded at Reel 011749, frame 0386.

II. RELATED APPEALS AND INTERFERENCES

Following are identified any prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal:

A Notice of Appeal was filed on June 27, 2005. Subsequently, an Appeal Brief was filed on August 31, 2005. In response to the August 31, 2005 Appeal Brief, an Office Action was issued on November 14, 2005, withdrawing the previous rejection but stating a new ground of rejection based on a new reference Sazzad (U.S. Patent Number 6,122,321). Following the November 14, 2005 Office Action, Applicant requested reinstatement of the previous Appeal pursuant to 37 CFR 1.193(b)(2)(ii) and concurrently filed a Supplemental Appeal Brief on December 19, 2005. In response to the December 19, 2005 Supplemental Appeal Brief, an Office Action was issued on March 14, 2006, withdrawing the rejection based on Sazzad but stating a new ground of rejection based on a new reference Timmermans (U.S. Patent No. 5,543,925). The new rejection led to this Appeal. None of the previous Appeal Briefs were followed by an Examiner's Answer. Thus, no previous Appeal related to this application has been considered by the Board.

III. STATUS OF CLAIMS

Claims 1-12 are on appeal.

Claims 1-12 are pending.

No claims are allowed.

Claims 1-12 are rejected.

No claims are canceled.

IV. STATUS OF AMENDMENTS

All Amendments have been entered into the record.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter recited in claims 1-10 relates to a video encoder and a method of selectably encoding images in either a first high resolution (see abstract) or a second lower resolution with the same resources, in particular memory. See page 2, lines 3-4. Specifically, the encoder includes a same memory unit for storing a reference image in a first high resolution when the encoder is used in high-resolution mode for encoding high-resolution images, and also for storing two reference images having said second lower resolution when the encoder is used in lower-resolution mode for encoding lower-resolution images. See page 3, lines 1-9.

The memory unit is further equipped with switches 82a and 82b for selectably switching the encoder into either the high-resolution encoding mode or the lower-resolution mode. See page 3, lines 14-20 and figure 1. When the encoder is operating in the high-resolution mode,

images having D1-resolution are written into and read from memory 81 with the switches 82a and 82b switching the encoder into the high-resolution mode. In this mode, only one image at this high-resolution is stored in memory 81 so that the encoder may produce I-pictures or P-pictures. See page 3, lines 21-24. I-pictures are autonomously encoded without reference to a previously encoded image. See page 3, lines 24-25. P-pictures a predictively encoded with reference to a previous I or P-pictures. See page 3, lines 24-25.

In the lower-resolution mode, images having ½ D1 resolution are written into and read memories 81a and 81b, which are two halves of the same memory 81, with the operation of two other switches 81a and 81b. See page 3, lines 16-18. Memory 81 is divided into these two halves (81a and 81b) for the purpose of storing two reference images having substantially half of the high-resolution. See page 3, lines 16-17. More importantly, the presence of two reference images in the memory enables the encoder to perform bi-directional (forward and backward) predictive coding of images in B-pictures (page 4, lines 10-11), which has the advantage of being encoded more efficiently than P-pictures (page 1, lines 15-16). Noticeably, this desirable feature will not otherwise be available when only one reference image is stored in the memory, which is the case for high-resolution mode using only I-pictures and P-pictures. See page 3, lines 21-24; and page 4, lines 8-11.

Conventional predictive video encoders are either encoding images in only one resolution using only I-pictures and P-pictures (page 1, lines 21-22), or encoding the same resolution using the more advantageous B-pictures but nonetheless requiring twice the memory capacity and twice the memory bandwidth. See page 1, lines 17-18. In contrast, the claimed invention allows

selectable encoding of images either in a first high-resolution mode using only I-pictures and P-pictures, or in a second, lower resolution mode using the more efficient B-pictures in addition to I-pictures and P-pictures, without further requiring substantially additional resources, in particular memory. See Abstract and page 2, lines 3-4. In achieving this feature, the same memory is utilized in storing one reference image when the encoder operates in high-resolution mode and storing two reference images so as to enable coding of B-pictures when the encoder operates in lower-resolution mode. See page 3, lines 21-24; and page 4, lines 8-11.

Independent apparatus claim 1 recites a video encoder for encoding images in a first resolution mode with reference to a reference image having said first resolution. See Abstract. The recited encoder comprises a memory for storing said reference image with said first resolution (page 3, lines 14-16), and control means for selectably encoding said images in a second, lower resolution with reference to two reference images having said second resolution (page 3, lines 18-20), and for also storing said two reference images with the second resolution in said memory (page 3, lines 16-20).

Independent claim 6 recites encoding images in a first resolution mode with reference to a reference image having said first resolution (Abstract), the method comprising the steps of: storing said reference images with said first resolution in a memory (page 3, lines 14-16); selectably encoding said images in a second, lower resolution mode with references to two reference images having said second resolution (page 3, lines 18-20); and storing said two reference images with the second resolution in said memory (page 3, lines 16-20).

Independent claim 11 recites a video decoder for decoding images in a first resolution mode with reference to a reference image having said first resolution. See Abstract; page 1, lines 8-9 and 15-16. The decoder comprises a memory for storing said reference image with said first resolution (page 1, lines 15-16; and page 3, lines 14-16); and control means for decoding said images in a second, lower resolution mode with reference to two reference images having said second resolution (page 1, lines 15-16; and page 3, lines 18-20), and for also storing said two reference images with the second resolution in said memory (page 1, lines 15-16; and page 3, lines 16-20).

Independent claim 12 recites a method of decoding images in a first resolution mode with reference to a reference image having said first resolution (Abstract; page 1, lines 8-9 and 15-16), the method comprising the steps of: storing said reference image with said first resolution in a memory (page 1, lines 15-16; and page 3, lines 14-16); decoding said images in a second, lower resolution mode with reference to two reference images having said second resolution (page 1, lines 15-16; and page 3, lines 18-20); and storing said two reference images with the second resolution in said memory (page 1, lines 15-16; and page 3, lines 16-20).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

A. Claims 1-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,485,279 to Yonemitsu et al. (hereafter Yonemitsu) in view of U.S. Patent No. 5,543,925 to Timmermans.

VII. ARGUMENT

A. Rejection of Claims 1-12 Under 35 U.S.C. §103(a)

The Final Office Action dated August 21, 2006, rejects claims 1-12 under 35 U.S.C. § 103(a) as being unpatentable over Yonemitsu in view of Timmermans.

a. No Proper Motivation to Combine Yonemitsu with Timmermans

Yonemitsu generally teaches encoding images in a lower resolution from the combination of a high-resolution image that is dynamically reduced and a single prior stored lower resolution image. This is shown in Figures 14, 16, 18 and 20.

Timmermans discloses an apparatus and a method for retrieving pictures from a data base medium storing such pictures in digitized form for a playback. See Abstract; col. 1, lines 9-20. In the data base medium, the picture files may contain a plurality of subfiles, each of which defines a representation of the same scanned picture but in different resolutions. See col. 7, lines 36-39.

The proper legal framework for evaluating obviousness requires an inquiry in to (1) the scope and content of the prior art. In re Rouffet, 149 F. 3d 1350, 1355 (Fed. Cir. 1998). In this respect, Applicant respectfully submits that the apparatus and the method disclosed in Timmermans, as only related to retrieving pictures from a data base medium, are completely unrelated to encoding images, much less encoding images in a lower resolution.

To be more specific, the picture files and the subfiles are pre-encoded before they are retrieved. See col. 7, lines 63-67. In particular, subfiles are pre-encoded in different lower resolutions primarily for the purpose of minimizing waiting time during a playback. See col. 7,

lines 60-62. Hence, Timmermans is only related to retrieving pre-encoded pictures in a data base medium for a playback, rather than concerned with encoding images in a lower resolution, as featured in Yonemitsu.

Consequently, a person of ordinary skill in the art likely will not turn to Timmermans for any teaching involving improvement of encoding images, much less encoding images in a lower resolution.

Page 3 of the Final Office Action mailed on August 21, 2006, states "However, Timmermans teaches that storage or memory file IP1 stores multiple resolutions of a picture, ... Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Yonemitsu and Timmermans, as a whole, for reducing costs and improving efficiency during the encoding and decoding of high quality image data for a clearer display during image playback." The Office Action implicitly assumes that image encoding is necessarily related to image playback. Applicant respectfully submits that this assumption is entirely improper. Thus, the Office Action provides no justification with respect to this assumption other than an overly broad hindsight construction.

In summary, Timmermans is not a proper reference to be combined with Yonemitsu. Accordingly, Applicant respectfully submits that the Office Action has not established a *prima facie* case of obviousness.

b. Even if Combined, Recited Limitations Are Not Met

When evaluating obviousness under 35 U.S.C § 103 (a), all claim limitations must be considered. In re Fine, 837 F. 2d 1071 (Fed. Cir. 1988). Furthermore, functional limitations must be evaluated and considered, just like any other limitation of a claim. See MPEP § 2173.05(g).

Applicant respectfully submits that even assuming, *arguendo*, that a proper motivation to combine Yonemitsu with Timmermans had been established, which it has not, the rejection of claims 1-12 is still improper and should be reversed because recited features are not disclosed by either Yonemitsu or Timmermans.

1. Claims 1 and 6

Claims 1 recites a video encoder comprising:

a memory for storing said reference image with said first resolution; and control means:

> for selectably encoding said images in a second, lower resolution mode with reference to two reference images having said second resolution, and
>
> for also storing said two reference images with the second resolution in said memory.

Claim 6 recites a method of encoding images comprising the steps of:

> storing said reference image with said first resolution in a memory;
>
> selectably encoding said images in a second, lower resolution mode with reference to two reference images having said second resolution; and
>
> storing said two reference images with the second resolution in said memory.

According to claims 1 and 6, the same memory (said memory) is being used for storing one reference image in first resolution and for storing two reference images in second resolution for selectably encoding images in two distinct resolutions. Applicant respectfully submits that neither Yonemitsu nor Timmermans discloses, teaches, or suggests this subject matter.

As correctly conceded in section 2 on page 6 of the Final Office Action, "Yonemitsu does not specifically disclose the memory for storing reference images in both first and second resolution." See page 6 of the Final Office Action. Hence, Yonemitsu does not disclose, teach, or suggest the subject matter of the same memory for storing one reference image in first resolution and for storing two reference images in second resolutions. In order to overcome this correctly conceded deficiency in Yonemitsu, the Office Action relies on Timmermans. However, Timmermans does not disclose that subject matter either.

Specifically, Timmermans does not disclose, teach, or suggest the same memory for storing one reference image in first resolution and for storing two reference images in second resolution. The Final Office Action relies on col. 7, lines 36-37 and figure 2 in Timmermans with respect to this subject matter. However, col. 7, lines 36-37 only teaches storing images in difference resolutions in a data base medium, as opposed to storing images in a memory. More specifically, the picture files and subfiles representing lower resolutions, mentioned in the Final Office Action (section 1, pages 3-4), are stored in a data base medium, which is known to be record carrier such as a compact disc (figs. 1a-1b, col. 4, lines 25-30, col. 6, lines 11-14, col. 7, lines 8-13, and col. 7, lines 35-52), rather than stored in a memory. This distinction with respect to where the images are stored was repeatedly pointed out and emphasized on page 8 of the

Amendment filed on June 2, 2006, but was barely addressed in the Final Office Action. See section 2 on pages 2-5 of the Final Office Action.

It appears that the Final Office Action implicitly concludes that there is no distinction between a data base medium and a memory, as understood by a person of ordinary skill in the art. This is especially evidenced by the repeated use of the term "memory file" (see page 2-4), which appears nowhere in Timmermans, when referring to picture file IP1 and its subfiles disclosed in Timmermans. Applicant respectfully submits that this construction is entirely mistaken, for Timmermans, in itself, readily recognizes that there is distinction between a data base medium and a memory.

Specifically, in claim 1, Timmermans differentiates a data base medium from a memory by separately claiming that a data base medium is used to store digitized pictures for retrieval (col. 27, lines 13-14) whereas a memory is used to store certain control information (col. 27, lines 34-44), such as picture representation parameters. See also col. 4, lines 5-8 and col. 22, lines 5-39. If data base medium and memory are indistinguishable, there is no need for claim 1 to separately set out what information should be stored in a data base medium and a memory respectively. Not surprisingly, claim 1 is not the only place in Timmermans that distinguish a "data base medium" and a "memory." In fact, the entire specification refers to these two terms in a distinguishing manner.

Hence, "memory" and "data base medium" refer to two distinct matters according to the clear teaching of Timmermans. Accordingly, storing images in a "data base medium," as taught in Timmermans, is distinctively different from storing images in a "memory," as recited in claims

1 and 6 of the Application. Accordingly, Timmermans does not disclose, teach, or suggest the subject matter of the same memory for storing one reference image in first resolution and for storing two reference images in second resolution.

Second, the functional recitations with respect to storing images in different resolutions are also distinctively different between the playback system that Timmermans teaches and the subject matter recited in the rejected claims. MPEP establishes that functional limitations must be evaluated and considered, just like any other limitation of a claim, when evaluating obviousness. See MPEP § 2173.05(g).

In Timmermans, storing subfiles in lower resolutions in a data base medium is for minimizing waiting time during retrieval for a playback (col. 7, lines 60-62). In contrast, storing reference images in second lower resolution in a memory, as recited in claims 1 and 6, is for a completely different function of "selectably encoding said images..." (emphasis added). Hence, even if Timmermans did teach the same memory for storing one reference images in first resolution and for storing two reference images in second resolution, which it does not, Timmermans still would not disclose, teach, or suggest the subject matter discussed above, because its functional limitation associated with storing images in different resolutions is distinctively different from that of the subject matter recited in the rejected claims. See MPEP § 2173.05(g).

Consequently, Timmermans does not disclose, teach, or suggest the same memory for storing one reference image in first resolution and for storing two reference images in second resolution for selectably encoding images in two distinct resolutions, as recited in claims 1 and 6.

Accordingly, Timmermans does not overcome the deficiency correctly admitted with respect to Yonemitsu. Applicant therefore respectfully submits that the combination of Yonemitsu and Timmermans fails to disclose, teach, or suggest all the subject matter recited in claims 1 and 6.

For at least the foregoing reasons, claims 1 and 6 are patentable over Yonemitsu in view of Timmermans because the combination of Yonemitsu and Timmermans does not teach or suggest each and every element recited in claims 1 and 6.

2. Claims 2-5 and 7-10

Claims 2-5 and 7-10 depend respectively from claims 1 and 6, and are therefore also patentable for at least the reasons stated above in connection with claims 1 and 6, as well as for the separately patentable subject matter recited therein.

3.Claims 11 and 12

Independent claims 11 and 12 recite a video decoder and a method of decoding images respectively corresponding to the encoder recited in claim 1 and the method of encoding recited in claim 6. Specifically, claims 11 and 12 recite the same memory for storing one reference images in first resolution and for storing two reference images in second resolution. The Final Office Action correctly conceded that this subject matter is not disclosed, taught or suggested in Yonemitsu. Similar to the reasons stated above in connection with claims 1 and 6, Timmermans does not overcome this correctly conceded deficiency in Yonemitsu. Accordingly, Applicant respectfully submits that the combination of Yonemitsu and Timmermans fails to disclose, teach, or suggest the subject matter according to the combinations recited in claims 11 and 12.

For at least the foregoing reasons, claims 11 and 12 are patentable over Yonemitsu in view of Timmermans because the combination of Yonemitsu and Timmermans does not teach or suggest each and every element recited in claims 11 and 12.

CONCLUSION

For at least the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-12 are in condition for allowance. For at least the above reasons, Appellants respectfully request that this Honorable Board reverse the rejections of claims 1-12.

Respectfully submitted,
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Date

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VIII. CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1. A video encoder for encoding images in a first resolution mode with reference to a reference image having said first resolution, the encoder comprising:

a memory for storing said reference image with said first resolution; and

control means:

for selectably encoding said images in a second, lower resolution mode with reference to two reference images having said second resolution, and

for also storing said two reference images with the second resolution in said memory.

2. The video encoder as claimed in claim 1, further comprising:

a motion estimation circuit applying a predetermined search strategy in the first resolution mode to search motion vectors representing motion between an input image and the reference image, said motion estimation circuit being arranged to apply said search strategy in the second resolution mode to both reference images.

3. The video encoder as claimed in claim 2, wherein selected images are encoded in the second resolution mode with respect to one of said reference images, the motion estimation circuit being arranged to apply the search strategy in a first pass to search motion vectors with a first precision, and to apply said search strategy in a second pass to refine the precision of the motion vectors found in the first pass.

4. The video encoder as claimed in claim 2, further arranged to selectably encode images in a third, yet lower resolution mode with reference to two reference images having said third resolution, said motion estimation circuit being arranged to apply said search strategy in the third resolution mode to both reference images, and to apply the search strategy for each reference image in a first pass to search motion vectors with a first precision, and to apply said search strategy in a second pass to refine the precision of the motion vectors found in the first pass.

5. The video encoder as claimed in claim 1, wherein said reference image having the first resolution is a previous image of a sequence of images, one of the reference images having the second resolution is a previous image of said sequence, and the other one of the reference images having the second resolution is a subsequent image of said sequence.

6. A method of encoding images in a first resolution mode with reference to a reference image having said first resolution, comprising the steps of:

storing said reference image with said first resolution in a memory;

selectably encoding said images in a second, lower resolution mode with reference to two reference images having said second resolution; and

storing said two reference images with the second resolution in said memory.

7. The method as claimed in claim 6, further comprising the step of:

searching motion vectors representing motion between an input image and the reference image in the first resolution mode, said searching being applied to both reference images in the second resolution mode.

8. The method as claimed in claim 7, wherein selected images are encoded in the second resolution mode with respect to one of said reference images, the searching step being applied in a first pass to search motion vectors with a first precision, and in a second pass to refine the precision of the motion vectors found in the first pass.

9. The method as claimed in claim 7, further arranged to selectably encode images in a third, yet lower resolution mode with reference to two reference images having said third resolution, said searching step being applied in the third resolution mode to both reference images, and in a first pass to search motion vectors with a first precision, and in a second pass to refine the precision of the motion vectors found in the first pass.

10. The A method as claimed in claim 6, wherein said reference image having the first resolution is a previous image of a sequence of images, one of the reference images having the second resolution is a previous image of said sequence, and the other one of the reference images having the second resolution is a subsequent image of said sequence.

11. A video decoder for decoding images in a first resolution mode with reference to a reference image having said first resolution, the decoder comprising :

a memory for storing said reference image with said first resolution; and

control means:

for decoding said images in a second, lower resolution mode with reference to two reference images having said second resolution, and

for also storing said two reference images with the second resolution in said memory.

12. A method of decoding images in a first resolution mode with reference to a reference image having said first resolution, comprising the steps of:

storing said reference image with said first resolution in a memory;

decoding said images in a second, lower resolution mode with reference to two reference images having said second resolution; and

storing said two reference images with the second resolution in said memory.

IX. EVIDENCE APPENDIX

A copy of the following evidence 1) entered by the Examiner, including a statement setting forth where in the record the evidence was entered by the Examiner, 2) relied upon by the Appellant in the appeal, and/or 3) relied upon by the Examiner as to the grounds of rejection to be reviewed on appeal, is attached:

NONE .

X. RELATED PROCEEDINGS APPENDIX

Copies of relevant decisions in prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal are attached:

NONE